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Between the White Sea and the Arctic Ocean the traveller found three series of ranges, separated by depressions covered with forests, marshes, and lakes. The Russian Lapps were well-made people, averaging over five feet in height. The people and officials everywhere gave him every assistance.

Precursors of Columbus. — Prof. Guido Cora reviews 'The precursors of Columbus' in a late number of the bulletin of the Italian geographical society. After an interesting résumé, he concludes that to Columbus is unquestionably due the opening of a new world to humanity as represented by civilized races; that the name of America is derived from some aboriginal word picked up by the companions of Columbus; that the precursors of Columbus, in their voyages toward America, were merely in search of wealth or prompted by a spirit of adventure, and not instigated by scientific prevision or the result of study of probabilities; that it is certain that the Scandinavians, Basques, and probably also the Irish, had reached American shores before Columbus; while to the brothers Zeno are due important charts and documents from which the previous discovery of America might be inferred.

Poliakoff's 'Journey in Sakhalin.' — A translation of Poliakoff's 'Journey in Sakhalin in 1881-82' has been made by Professor Arzruni, and published by Asher & Co. This forms a sort of monograph of the products, industries, and people of this little-known island, and is well worthy the attention of ethnologists and geographers. It contains especially rich contributions to the anthropology, mineral products, fisheries, and geography. The Ainos, who inhabit the southern portion, are exhaustively treated of. As the original documents are largely in Russian, this may be said to be for most students the first effective publication of the material.

Pilcomayo expedition to Bolivia. — Some news has been received from the latest expedition of M. Thouar, who is endeavoring to find a trade-route, *via* the Pilcomayo, between Bolivia and the Argentine states. He left Assumption Sept. 28, with an escort of twenty-eight experienced soldiers, two months' provisions, and a sufficient number of horses, mules, etc. A volunteer, Mr. Wilfrid Gilbert, accompanied the party. Major Feilberg, as mentioned by us at the time, recently ascended the river by water, finding a minimum of six feet of water in the channel up to Lambara, a point two hundred and fifty-five miles from the mouth of the Pilcomayo. Here the party was arrested by the rapids, over which there were not more than two feet of water, rendering navigation impossible, and deciding the return of the expedition. Since then an Argentine column, com-

manded by Captain Gomenzorro, has raided the borders of the river, killed or routed the people of the Toba tribe, living on its banks, and brought back a good deal of plunder and a few prisoners. Defeats of this kind, however, have not hitherto had much effect on the Tobas, beyond causing them to retreat temporarily into their jungles. They have avenged, as in the case of Crevaux, on other white men, the destruction visited on their villages. With this unpromising state of things, Thouar's plan of ascending the river by land, with the above-mentioned small escort, for the purpose of investigating the rapids and determining whether any improvement of the river at that point is possible, seems almost foolhardy; and it is to be regretted that the counsel of those who advised an expedition by water was not adopted.

LONDON LETTER.

THE University of Cambridge has just suffered a severe loss by the death of its librarian, Mr. Henry Bradshaw, senior fellow of King's college. The present efficiency of the university library is almost entirely due to his untiring efforts during the many years that he was at its head. His bibliographical investigations were remarkable for their accuracy, and were carried out with a truly scientific precision, while he took a special interest in that department of his duties which was connected with the literature of systematic zoölogy. Others will follow him in the post of university librarian; but it is not given to many men to be so truly mourned as Mr. Bradshaw is by the many generations of Cambridge men who knew and loved him. The terms of the university statutes require that the post shall be filled within a fortnight of its becoming vacant; and it is probable that the choice of the electors will fall upon Prof. W. Robertson Smith, the editor of the 'Encyclopaedia Britannica,' who is so well known in the subject of Old-Testament criticism. He is a fellow of Christ's college, and lord-almoner's reader in Arabic to the university.

The school of engineering at Cambridge has been making considerable progress of late years under the direction of Prof. James Stuart, M. P. for Hackney; and it is now proposed to institute a tripos examination in engineering, which should be combined to some extent with the natural sciences tripos, and would include a very considerable amount of practical work, together with some of the higher branches of mathematics.

Honor candidates who find a difficulty in mathematics need no longer be troubled with them among the 'additional subjects' of the previous

examination, which are incumbent upon all who propose to enter for a tripos, for French and German have been introduced as alternative subjects. This will be a great boon to the classical men, who have hitherto been obliged to pass a mathematical examination before they could get classical honors. In fact, the 'additional subjects' of the 'Little Go' are merely a relic of the time when candidates for honors in any subject had first of all to graduate in mathematics; and the result of this was that many of the best classical men contented themselves with ordinary degrees. Now, however, all this is changed, and their path to distinction is much easier than it used to be.

A movement of the same kind is on foot in the University of London also. At a recent meeting of convocation (to which all graduates of a certain standing have the right to belong) a committee was appointed to consider the desirability of the establishment of degrees in engineering. The first meeting of this committee is to be held to-day. It is within the knowledge of the present writer, that many well-established engineers are feeling the want of a knowledge of electricity, and hence it seems desirable, that, for any degree in engineering, a theoretical as well as practical acquaintance with electricity should be exacted from all candidates.

Probably the most complete private electric installation in the world is now to be found at the house of Sir David Salomons, Bart, at Tunbridge Wells, about thirty miles south-east of London. On several occasions lately, he has kindly invited parties of leading electricians and engineers to inspect it, and most hospitably entertained them there. The boilers, steam-engines, generating-dYNAMOS, etc., are all in duplicate; and opening out of the room containing those, is a large and very complete series of the E. P. S. storage-batteries. Under ordinary circumstances, the engine does not run more than six or eight hours daily. In a sort of annex to the house is a magnificent private workshop, with lathes, saws, planing-machines, and all sorts of 'tools.' The whole of these are worked from two or three motors, which put in motion the overhead shafting. Many thousand pounds must have been spent upon this unique installation.

The discussion upon Prof. D. E. Hughes's paper, upon "The self-induction of an electric current in relation to the nature and form of its conductor," was concluded last night at the Society of telegraph engineers and electricians. During the three evenings devoted to it, Lord Rayleigh, Prof. George Forbes, Professor Ayrton, Dr. Hopkinson, Prof. S. P. Thompson, Dr. Fleming, Mr. Frank Pope of New York, Mr. Preece, and many others

expressed their sense of the very great value, ingenuity, and originality, of Professor Hughes's researches,—an opinion which was universally re-echoed in conversation among the members generally. Great applause greeted the proposal with which Dr. Fleming (of the Edison light company) closed a very effective speech, to call the co-efficient of the unit of self-induction a 'Hughes.' Both Mr. Frank Pope and Mr. Preece, as practical telegraphists, pointed out how the experimental results now obtained by Professor Hughes provided a clear explanation of certain remarkable facts observed in telegraphy; and Mr. Preece paid a warm tribute to Professor Hughes's ingenuity by pointing out, that, whereas the speaker had had to erect a pair of lines two hundred and seventy-eight miles in length to compare the telegraphic speed of iron and copper wires, Professor Hughes's wonderfully ingenious and delicate induction-bridge had enabled him to predict the same result from experiments upon only ten inches of wire. Perhaps the most important practical feature in the paper was that self-induction in iron wire could be cured by stranding the wire; but all of the results are a remarkable illustration of science enriched by practice.

W.

London, Feb. 26.

BOSTON LETTER.

THE topographical survey of Massachusetts, undertaken by the state in conjunction with the U. S. geological survey, has now been in progress for a year and a half, and about 3,250 square miles have been surveyed, or somewhat less than half the state. The parts already covered include the extreme western border of the state, embracing our highest elevations; two central sections,—one at the Connecticut, and the other around Worcester; the region about Boston; and almost the whole of the area to the south of it, lying to the east of Rhode Island, the character of which is very different from other parts of the state, hardly any parts of it being commanded by elevated positions. Hence, in surveying this, the plane-table has been laid aside, and the whole district has been mapped by traverse work; the courses of the streams, and the shore-lines of the open water spaces, being worked in by a winter party taking advantage of the ice. There is also a little completed patch in the extreme north-eastern corner of the state.

According to an estimate made by the commissioners of the survey, the cost of the work the past season has varied from about eight to nineteen dollars per square mile, and an average of a